Experimental Options Review FY 07- FY11

AMWG Meeting

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Background and Purpose

- Background: AMP has been evaluating MLFF for 10 years
- Purpose: Identify a suite of flow and non flow actions that will be implemented or tested in FY 07-11
  - Provides foundation for 5 Year Monitoring and Research Plan and FY 07-08 AWP
- General Goals of Options:
  - Improve resource conditions
  - Enhance understanding (learning) of relationship between proposed action and target resource
- Developed cooperatively w/ SPG

Experimental Options

1. Continue evaluating MLFF in spring/summer/ fall, w/ winter ramping experiments + BHBF in winter/spring
2. Continue evaluating MLFF in spring and summer, w/ winter ramping experiments + BHBF in winter/spring + **stable flows in Sept & October**
3. Increased fluctuating flows in summer and winter + BHBF in fall + implementation of a suite of management actions
4. Seasonally adjusted steady flows throughout the year + spring BHBF

Experimental Option #1

Continue evaluating MLFF in spring/summer/ fall, w/ winter ramping experiments + BHBF in winter/spring

- **Scientifically the least confounded approach**
  - Builds on previous learning tied to baseline operations
  - Provides continuity with Phase IV (2003-2006) activities
  - Understand the effect of natural warming and trout removal
- **Includes actions to benefit resources**
  - HBC (translocation, refuge, TCD, exotic fish management)
  - Sediment conservation (winter/spring BHBF)
- **Follows Secretary's mandate to evaluate ROD**
- **Benefits for hydropower resources**
  - Mini-experiment studies of alternative ramping rate/range

Experimental Option #2

Continue evaluating MLFF in spring and summer, w/ winter ramping experiments + BHBF in winter/spring + stable flows in Sept & October

- **Evaluates the effects of steady late summer-fall flows on humpback chub growth/ recruitment**
- **Impacts hydro power generation, but at times of low demand**
- **Includes actions to benefit resources**
  - HBC (translocation, refuge, TCD, exotic fish management)
  - Sediment conservation (winter/spring BHBF)
- **Builds on previous learning tied to baseline operations**
- **Follows Secretary's mandate to evaluate ROD**

Experimental Option #3
WAPA/AGFD/FFF

Increased fluctuating flows in summer and winter + BHBF in fall + implementation of a suite of management actions

- **Emphasizes achieving resource improvements using a suite of flow and non-flow actions**
  - HBC (e.g., exotic fish control, augmentation, translocation, TCD)
  - Sediment conservation (fall BHBF)
- **Increased fluctuating flows in winter and summer targeted at:**
  - Hydropower generation during periods of high demand
  - Aquatic food base production and delivery (RBT an HBC)
  - Rainbow trout fishery below GCD
- **Additional knowledge gained through small, short-term experiments (stable flows, ponding, etc)**
- **Lack of structured experimental design confounds learning (understanding cause/effect relationships)**

Experimental Option #4 (GCT)

Seasonally adjusted steady flows throughout the year + spring BHBF

- Tests a combination of stable/fluctuating flows and variable water temperatures (4 year test blocks) in conjunction with non-native fish control
- Aimed at providing resource benefits and addressing research questions related to Goals 1 (**food base**), 2 (**humpback chub**), 7 (**water temperature, quality and flow dynamics**), 8 (**sediment**), 9 (**recreation**), and 11 (**cultural resources**)
- Provides information to assist in design and operation of a TCD
- Consistent with the GCPA, park values, biological opinion, AMWG priorities, and the best available science
- Significant impact to power generation (stable flow years)
- Factorial design facilitates understanding of cause/effect relationships

Status and Next Steps

- GCMRC Experimental Options Report
  - Describes/compares options and assesses resource impacts (+/-) (based on Knowledge Assessment)
- SPG Review/discussion (ongoing)
- TWG Review (April)
- TWG Approval (June)
- AMWG Approval (August)

Table 1.1 Side-by-Side Comparison of Experimental Treatments and Other Activities Proposed within Four Hybrid Design Options

Flow/Non-Flow Treatment, Management Option or Conservation Measure	**Option #1** **MLFF + Alt. FF (winter) w/ Enriched winter/spring BHBF**	**Option #2** **MLFF + Alt. FF (winter) + Fall Stable Flows, w/ Enriched winter/spring BHBF**	**Option #3** **Alt. FF (winter & summer), w/ Enriched Fall BHBF**	**Option #4** **Stable Flow Test, all months, w/ Enriched spring BHBF**
Alternative Fluctuations	Yes, (winter only)	Yes, (winter only)	Yes, (winter & summer)	No
Stable Flows	No, (fluctuations in all months)	Yes, (but only in Sep. - Oct.)	No	Yes, (all months)
BHBF 41,000 to 45,000 cfs, 1-3 days, in various seasons)	Yes, (in Jan. - Apr., new test w/FF, after sand inputs of summer/fall & prior to BHBF)	Yes, (in Jan. - Apr., new test w/FF, after sand inputs of summer/fall & prior to BHBF)	Yes, (in fall months after sand inputs of summer/fall enter river)	Yes, (potentially every spring, depending on sand supply and Native Fish considerations)
Ramping Rate Studies	Yes	Yes	Yes	No
Tests of Exotic Fish Control, (Warmwater)	Yes	Yes	Yes	Yes
Build/Test (SWS), all units	Yes	Yes	Yes	Yes
HBC Translocation	As per HBCCP recommendation	As per HBCCP recommendation	Yes	Depends on Analysis
HBC Refuge(s)	Yes	Yes	Yes	Same As Above
HBC Population Augmentation	No	No	Yes, Today!	No Way!
Control of Coldwater Fish	Yes, as needed	Yes, as needed	Yes, as needed	Yes, as needed
EXPERIMENTAL DESIGN	Forward Titration w/ future option for Factorial after SWS is operational (2011)	Forward Titration, w/future option for Factorial after SWS is operational (2011)	Reverse Titration, if the desired fishery response is detected by 2011	Forward Titration, continued through 2011, with move to Factorial in 2012, when SWS is then operated with Fluctuating Flows
Mini Experiments	Yes, e.g. winter EXP FF, controlled HBC laboratory tank studies, etc.	Yes, e.g. winter EXP controlled HBC laboratory tank studies, etc.	Yes, e.g. fall stable, spring ponding & , summer stranding flows	Yes, e.g. controlled HBC laboratory tank studies, etc.

Note: 1) Cells highlighted in GREEN indicate HBC conservation measures associated with the HBC Comprehensive Plan. These are integral component of the "Hybrid" design concept desired by AMWG, but may have confounding influence on evaluation of specific experimental flow and non-flow treatments (treatments that are not designated as management actions). 2), mini-experiments are experiments that do not confound man experimental treatment effects.